Claims

1. A quartz glass crucible for pulling up single crystal silicon, comprising a crucible base body having a bottom part and a side wall, with an inner layer provided to the inner surface thereof, characterized in that said inner layer comprises

   a) a first part made of a synthetic quartz extending from the bottom to at least a height of 0.25H;

   b) a second part made of a naturally occurring quartz glass or made of mixed quartz glass of naturally and synthetic quartz glass extending in a range of from at least 0.5H to 0.8H;

   c) and a residual part made of quartz glass selected from a synthetic quartz glass, a naturally occurring quartz, or a mixed quartz glass of naturally and synthetic quartz glass,

   wherein H represents the height from the lowest side of the bottom part to the upper end plane of the wall.

2. A quartz glass crucible according to claim 1, wherein the mixing ratio for the naturally occurring silica powder in the mixed powder of naturally occurring silica and synthetic silica for forming the mixed quartz glass of naturally occurring quartz glass and synthetic quartz glass accounts for 30 % or higher.

3. A quartz glass crucible according to claim 1, wherein the thickness of the second part is preferably in a range of from 0.3 to 3 mm.

4. A quartz glass crucible according to claim 1, wherein the thickness of the first part of the inner layer is preferably in a range of from 0.5 to 5 mm.

5. A method for producing a quartz glass for pulling up single crystal silicon comprising a crucible base body having a bottom part and a side wall enclosing an inner cavity portion, by setting a high temperature atmosphere

inside the cavity portion of the quartz glass crucible base body being attached to a rotating mold, and supplying a silica powder into said high temperature atmosphere to form an inner layer on the inner surface of the crucible base body by melting and vitrifying the silica powder, characterized in that the forming of the inner layer comprises

a) forming of a first part of the inner layer extending from the bottom to at least a height of 0.25H which is made of a synthetic quartz glass;

b) forming of a second part of the inner layer, extending in a range of from at least 0.5H to 0.8H, which is made of a naturally occurring quartz glass or a mixed quartz glass of naturally and synthetic quartz glass;

c) forming of a residual part of the inner layer, made from a quartz glass selected from a synthetic quartz glass, a naturally occurring quartz glass, and a mixed quartz glass of naturally and synthetic quartz glass,

wherein H represents the height from the lowest end of the bottom part to the upper end plane of the wall.

6. A method according to claim 5, wherein for supplying the silica powder into the high temperature atmosphere a supplying nozzle is used, by which synthetic silica-powder is supplied to a first part in order to form the inner layer on the bottom part of the crucible base and in the vicinity thereof, and then moving the supply nozzle in order to supply naturally occurring silica powder or a mixed powder of naturally occurring silica or synthetic silica to a second part being a separate from the first part, in order to form the second part of the inner layer on the crucible base body.

7. A method according to claim 5, wherein the inner layer is produced by forming a preliminary quartz glass layer on the entire inner surface of the crucible base body by supplying a first silica powder into the high temperature atmosphere whereby the first silica powder is naturally occurring silica powder or a mixed powder of naturally occurring silica and synthetic silica, and melting and vitrifying the first silica powder, and then

forming the first part of the inner layer by supplying, melting and vitrifying a synthetic silica powder.

8. A method according to claim 5, wherein the inner layer is produced by forming a preliminary quartz glass layer on the entire inner surface of the crucible base body by supplying a synthetic silica powder into the high temperature atmosphere and melting and vitrifying the synthetic silica powder, and then forming the second part of the inner layer by supplying, melting and vitrifying a silica powder which is naturally occurring silica powder or a mixed powder of naturally occurring silica and synthetic silica.